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on March 30, 2004

Kathy E. Raymond  
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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant :	Earl Ault	Docket No. :	IL-10680
Serial No. :	09/661,653	Art Unit :	2828
Filed :	09/14/2000	Examiner :	Davienne N. Monbleau
For :	HIGH POWER LASER HAVING A TRIVALENT TITANIUM LIQUID HOST		

Honorable Commissioner for Patents  
Alexandria, VA 22313-1450

Attention: Board of Patent Appeals and Interferences

Dear Sir:

**APPELLANT'S REPLY BRIEF**

This Reply Brief is submitted in response to the "Examiner's Answer." The Examiner's Answer was mailed March 17, 2004. Appellant's Reply Brief is transmitted in triplicate.

### Not Obvious to Substitute *Chun's* Two Chambers for *Kocher's* Single Chamber

On pages 3 and 5 of the Examiner's Answer, the statement is made, "Since gas is a flowing liquid, it would have been obvious to one of ordinary skill in the art at the time of the invention to use two chambers in *Kocher*, as taught by *Chun*."

Appellant disagrees with the Examiner's statement.

Appellant points out that a gas is not a flowing liquid.

Merriam-Webster's dictionary defines "liquid" as:

"Liquid: having the properties of a liquid: being neither solid nor gaseous."

Encyclopedia Britannica defines "liquid" as:

"Liquid: in physics, one of the three principal states of matter, intermediate between gas and crystalline solid." . . . "The most obvious physical properties of a liquid are its retention of volume and its conformation to the shape of its container. When a liquid substance is poured into a vessel, it takes the shape of the vessel, and, as long as the substance stays in the liquid state, it will remain inside the vessel. Furthermore, when a liquid is poured from one vessel to another, it retains its volume (as long as there is no vaporization or change in temperature) but not its shape. These properties serve as convenient criteria for distinguishing the liquid state from the solid and gaseous states. Gases, for example, expand to fill their container so that the volume they occupy is the same as that of the container. Solids retain both their shape and volume when moved from one container to another."

A gas is not a flowing liquid and it would not be obvious to use the *Chun* two gas chambers in the *Kocher* system that uses a single liquid chamber.

Features from gas lasers are not freely or "obviously" used in liquid lasers.

The *Chun* gas laser reference does not provide a teaching of a solution to optical distortion; therefore the Examiner's substituting *Chun's* two gas chambers for *Kocher's* single liquid chamber would not be obvious. There is no teaching that optical phase errors exists in a gas laser. Optical phase error is a problem that tends to occur in liquids because liquids are far denser than a gas. The fact that the *Chun* laser has two gas chambers is not a teaching of providing two liquid chambers in the *Kocher* liquid laser

to solve the problem of “thermally induced optical phase errors.”

Appellant also disagrees with the Examiner’s statement on page 3 of the Examiner’s Answer that Appellant’s claimed two chambers “is a mere duplication of parts.” Appellant’s two claimed chambers are arranged so that flow through the chambers are in opposite directions thereby performing the function of correcting thermally induced optical phase errors. Appellant’s claimed two chambers are more than just a duplication of parts.

In Appellant’s claimed invention “thermally induced optical phase errors” in the liquid host are corrected by flowing the “liquid host into and out said lasing chamber in a second direction that is opposite to said first direction.” The *Chun* structure is a gas laser and there is no teaching that “thermally induced optical phase errors” even exist in gas lasers. Since the *Chun* reference does not recognize the problem, there is no basis for the Examiner’s statement, “Since gas is a flowing liquid, it would have been obvious to one of ordinary skill in the art at the time of the invention to use two chambers in *Kocher*, as taught by *Chun*.”

#### Not Obvious to Use *Scheps*’ Trivalent Titanium Ions in *Kocher*’s Liquid Host

On pages 4 and 5 of the Examiner’s Answer, the Examiner acknowledges that, “*Kocher* does not teach trivalent titanium ions dissolved in a liquid host.” The Examiner would substitute the doped trivalent titanium ions of the *Scheps*’ solid laser in *Kocher*’s liquid host. Appellant submits such substitution would not be obvious.

Encyclopedia Britannica defines “solid” as:

“One of the three basic states of matter, the others being liquid and gas. A solid forms from either of these two states because the energy of atoms decreases when the atoms take up a relatively ordered, three-dimensional structure. Solids exhibit certain characteristics that distinguish them from liquids and gases. All solids have, for example, the ability to support loads applied either perpendicular or parallel to a surface (*i.e.*, normal or shear loads, respectively). Such properties

depend on the properties of the atoms that form the solid, on the way those atoms are arranged, and on the forces between them.”

To substitute features from the *Scheps* reference solid state laser system into the *Kocher* liquid laser system would not be obvious because solid state laser features in a liquid laser would not have any reasonable expectation of success. The liquid and solid laser systems are so different the features can not be substituted from one system into another. For example, using the feature of doping the crystals in the *Scheps*’ solid state laser in *Kocher*’s liquid laser would not be obvious because doping applies to solids and does not apply to liquids. The *Scheps* reference only briefly mentions a liquid prism, and does not teach trivalent titanium ions in a liquid host. The *Scheps* reference does not describe or show an embodiment with a liquid prism and the *Scheps* reference is not enabling for such a feature.

#### Not Obvious to Use *Chun* Structure in *Kocher* to Solve Optical Distortion

On page 7 of the Examiner’s Answer, the Examiner would substitute the *Chun* structure in the *Kocher* laser system to solve the problem of optical distortion. Appellant submits such substitution would not be obvious.

The *Chun* structure is a gas laser. There is no teaching that the problem of optical distortion exists in a gas laser. Optical distortion is a problem that tends to occur in liquids not in gases.

*Kocher* is the only reference that identifies the problem of “optical distortion” and *Kocher* states, “Since the optical distortion of the laser output beam is caused primarily by the unequal liquid velocities in the cell, it appeared that this distortion could be substantially eliminated by creating a more uniform liquid velocity.” The *Kocher* reference solution is “Large scale disturbance in the active material entering the cell are smoothed while the liquid flows around the flow control means thereby preventing these disturbances from causing distortion in the output laser beam.” The *Kocher*

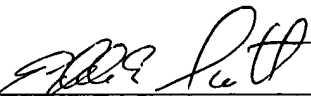
reference does not show or teach Appellant's solution of "circulating said trivalent titanium ions dissolved in a liquid host into and out said lasing chamber in a second direction that is opposite to said first direction provides a system for correcting said thermally induced optical phase errors." There is nothing from the *Chun* reference that renders Appellant's claimed solution obvious.

### SUMMARY

It would not be obvious to combine the three references as has been done by the Examiner. *Kocher* is a liquid laser. *Chun* is a gas laser. *Scheps* is a solid state laser. Features from such different lasers can not be "obviously" substituted from one to another. The features from the *Chun* gas laser and the *Scheps* solid laser can not be obviously substituted into the *Kocher* liquid laser as proposed by the Examiner.

It is respectfully requested that all of the claims on appeal (claims 1, 3, 4, 5, and 9) be allowed.

Respectfully submitted,

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